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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/507,337	04/25/2005	William V. Glenn Jr.	GLENN-69462	2857

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EXAMINER	
FERNANDEZ, KATHERINE L	
ART UNIT	PAPER NUMBER
3768	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/507,337	GLENN JR. ET AL.	
	Examiner	Art Unit	
	Katherine L. Fernandez	3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/26/06*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/14/04 and 10/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged.

Information Disclosure Statement

2. The information disclosure statements filed on December 14, 2004 and October 26, 2006 are acknowledged. The information disclosure statements meet the requirements of 37 C.F.R. 1.97 and 1.98 and therefore the references therein have been considered.

3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Objections

4. Claims 1 and 9-10 are objected to because of the following informalities:

Regarding claim 1, the claim recites the limitation "the colon" in line 12. There is insufficient antecedent basis for this limitation in the claim. It is assumed that the applicant is referring to the tubular body.

Regarding claim 9, the claim recites the limitation "at least one of the library of geometrical patterns" in lines 5-6. This statement has a grammatical error and should be corrected to "at least one of the libraries of geometrical patterns." Once corrected,

this statement infers that there are multiple libraries, and there is insufficient antecedent basis for this limitation in the claim. It is assumed that the applicant is referring to at least one of the geometrical patterns.

Regarding claim 10, the claim recites the limitation "at least one of the library of geometrical patterns" in lines 5-6. This statement has a grammatical error and should be corrected to "at least one of the libraries of geometrical patterns." Once corrected, this statement infers that there are multiple libraries, and there is insufficient antecedent basis for this limitation in the claim. It is assumed that the applicant is referring to at least one of the geometrical patterns.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 13 is rejected under 35 U.S.C. 102(b) as being anticipated by Yanof et al. (U.S. Patent No. 5,734,384).

Yanof et al. disclose a system for displaying views of data generated during a scan of a body portion of a patient (column 1, lines 16-25 and column 2, lines 42-46). They disclose that their system includes a memory for storing scan data (column 2, lines 49-52). Further, Yanof et al. disclose that their system includes a processor (82) capable of being programmed to analyze scan data, with the processor in operable

communication with the memory and configured to manipulate data in the memory (B) to render a flattened view of a 3D volume (column 17, lines 24-28, Figure 1). They also disclose that their system includes a display (D, Figure 1) for displaying the flattened view (28 and 30, Figure 2).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. Patent No. 6,212,420) in view of Linford et al. (U.S. Patent No. 5,854,850).

Regarding claim 1, Wang et al. disclose a system and method for visualizing and quantifying data associated with tubular body structures, such as the colon, which has a lumen defined by a wall (column 3, lines 22-44). They disclose that they use spiral CT to provide the data set for their method, which is known to produce a plurality of cross-sectional images that can later be reconstructed into a three-dimensional image (column 1, lines 58-67 through column 2, lines 1-22). As depicted in Figures 12 and 13, the images are taken along a longitudinal axis of a tubular body. Further, Wang et al. disclose that a central pathway is identified through a lumen of the 3D images (column 5, lines 34-45). A starting point is selected along the central pathway (column 8, lines 37-40). Their method further includes the steps of processing the data beginning at

their initial point in the central pathway and continuing along the longitudinal path of the 3D image of the colon and rendering a flattened view of the 3D image (column 5, lines 34-45, and column 8, lines 35-67 through column 9, lines 1-13). The flattened view of the image is displayed (Figure 12c-d, and Figure 13 c-d; column 16, lines 66-67).

However, they do not disclose that the data representing the flattened view is stored in an image buffer.

Linford et al. disclose an imaging system to be used for editing digital images. They disclose the use of various buffers in their system to store image data (Figure 2). At the time of the invention, it would have been obvious to one skilled in the art to have stored the flattened view in an image buffer. The motivation for doing so would have been that buffers have typically been used to store and manipulate/edit image data, as taught by Linford et al. (column 4, lines 28-30).

Regarding claim 2, Wang et al. disclose that their method further includes the steps of selecting a point along the central pathway, processing the data at the selected point and rendering an image of a cross-section of the wall of the tubular structure at the selected point (column 13, lines 56-67 through column 14, lines 1-35). The images of the cross-section of the wall of the tubular structure can then be displayed (Figure 10 and Figure 11).

9. Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Linford et al. as applied to claims 1-2 above, and further in view of Bartroli et al. ("Virtual Colon Flattening", May 2001).

Regarding claim 3, Wang et al. do not specifically disclose that a voxel value is added to an image buffer. However, Linford et al. disclose that buffers are used to store image data and are updated, which would involve adding pixel/voxel values to the buffer (column 5, lines 60-67 through column 6, lines 1-16). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to add a voxel value to an image buffer. The motivation for doing so would have been to update the image buffer, as taught by Linford et al. (column 5, lines 60-67 through column 6, lines 1-16).

However, Wang et al. in view of Linford et al. do not specifically disclose that processing the data and rendering the flattened image comprises projecting a ray from the starting point to the wall with the direction of the ray corresponding to an angle of view. Bartroli et al. disclose a method to visualize virtual endoscopic views (abstract). Their method includes a projection procedure that involves moving a camera along the central path of a colon, and then defining a small cylinder tangent to the path (Section 2). They disclose that rays starting at the cylinder axis and orthogonal to the cylinder surface are traced, finally resulting in a flattened image (Section 2, also see Figure 2). As can be seen in Figure 3, the direction of the ray corresponds to an angle of view. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have processed the data and render the flattened image using the above mentioned steps. The motivation for doing so would have been to produce a flattened image that does not have the double appearance of polyps as taught by Bartroli et al. (Section 2).

Regarding claim 4, Wang et al. in view of Linford et al. do not specifically disclose that the angle of view is shifted by one degree, nor that another ray is projected from the starting point to the wall, with the direction of the ray corresponding to the shifted angle of view if the angle of view has not been shifted a total of 360 degrees from the initial starting point. Bartroli et al. disclose that several rays are projected from the starting point, with the direction of the ray corresponding to an angle of view, and the projection rays seem to stop before the angle of view has been shifted a total of 360 degrees from the starting point (Figure 3). They further disclose that the angle of view is shifted and that the angle increment should not be too large (so it would appropriate to shift the angle of view by one degree) (Section 3.1). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to shift the angle of view and project another ray from the starting point to the wall. The motivation for doing so would have been to ensure that the object is sampled uniformly as taught by Bartroli (Section 3.1).

Regarding claim 5, Wang et al. disclose advancing the current path point to the next central path point (which lies along the longitudinal axis of the lumen) if all cross sections have not been generated, thus repeating their cross section formation steps until the entire length of the lumen has been processed. (column 8, lines 35-67). However, they do not specifically disclose that the point is advanced if the angle of view has been shifted a total of 360 degrees from the initial starting point. Bartroli et al. disclose that the angle of view covers the entire region (360 degrees) and also that the camera is moved along the central path of the colon (Section 2, and Figure 3). At the time of the invention, it would have been obvious to a person of ordinary skill in the art

to have advanced the starting point by a selected value if the angle of view has been shifted a total of 360 degrees from the starting point. The motivation for doing so would have been to sample the object uniformly as taught by Bartroli et al. (Section 3.1).

However, the combined references of Wang et al. and Bartroli et al. do not disclose that the voxel values are stored in an image buffer. As discussed above, Linford et al. disclose storing voxel values in a buffer (column 5, lines 60-67 through column 6, lines 1-16). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have stored the voxel values in an image buffer. The motivation for doing so would have been to update the image, as taught by Linford et al. (column 5, lines 60-67 through column 6, lines 1-16).

Regarding claim 6, Wang et al. disclose that the tubular structure is a colon (column 5, lines 53-67).

Regarding claim 7, as discussed above, Wang et al. disclose a method for generating a view of the interior wall of a tubular structure of a body including tissue adjacent the exterior of the wall (Figure 13d). Their method includes the steps of providing a data set of a 3D volume representing a tubular structure of the body taken along a longitudinal axis of the tubular body, with the tubular body having a lumen defined by a wall (column 3, lines 22-44, Figures 12 and 13). Further, they disclose that a starting point along a central pathway disposed along the longitudinal axis of the tubular body is selected (column 8, lines 37-40). A subsurface volume image is also displayed (Figure 13a-b). However, they do not disclose that a ray is projected towards the wall a selected distance by stepping towards the wall along the ray from the starting

point, calculating a voxel value at the location of each step of the ray, incrementing the angular projection of the ray one degree, determining if the angular projection of the ray has been incremented 360 degrees since the starting point was selected, projecting a ray having the incremented angulation toward the wall, nor that the above steps are repeated until the angular projection of the ray has been incremented 360 degrees. As discussed above for claims 3 through 5, the above steps are met by Bartroli et al (Sections 2-3). At the time of the invention it would have been obvious to a person of ordinary skill in the art to have included the above steps in the method of Wang et al. The motivation for doing so would have been to be able to inspect flattened regions of the tubular object and avoid double counting of polyps, as taught by Bartroli et al. (Section 2).

Wang et al. in view of Bartoli et al. do not disclose that the voxel value is added to an image buffer. Linford et al. disclose that buffers are used to store image data and are updated, which would involve adding pixel/voxel values to the buffer (column 5, lines 60-67 through column 6, lines 1-16). At the time of the invention, it would have been obvious to include the step of adding the voxel value to an image buffer as taught by Linford et al. The motivation for doing so would have been to update the image, as taught by Linford et al. (column 5, lines 60-67 through column 6, lines 1-16).

Regarding claim 8, Wang et al. disclose that the tubular structure is a colon (column 5, lines 53-67).

10. Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Linford et al. as applied to claims 1-2 above, and further in view of Vining et al. (U.S. Patent No. 5,920,319).

Regarding claims 9 and 11, as discussed above, Wang et al. in view of Linford et al. meet the limitations of claim 1. However, they do not disclose that the 3D volume data set is compared to a library of geometrical patterns representative of predetermined abnormalities, nor that a structure is identified as abnormal if the structure is determined to match at least one of the geometrical patterns within a predetermined tolerance. They also do not disclose that further processing of the identified abnormal structure is performed to determine if the identified structure is abnormal. Vining et al. disclose a system and method for displaying a 3D rendering of a structure having a lumen and for automatically analyzing such structures for potential abnormalities (column 1, lines 15-19). They disclose that their method of identifying abnormal structures (lesions) involves forming populations of potential abnormalities based on vertices on the wireframe model associated with a library of geometrical patterns, such as abnormal wall thickness, abnormal shape, and abnormal curvature (column 10, lines 56- 67 through column 11, lines 1-10). Further, they disclose that populations with sizes below a minimum value are eliminated from being identified as abnormal (Figure 1, 46). Their method also involves further processing the identified abnormal structure to determine if the identified structure is not abnormal (column 11, lines 22-35). At the time of the invention, it would have been obvious to include the above steps to the method. The motivation for doing so would have been to be able to

provide a more efficient, less time-consuming, less expensive, and more accurate technique to identify abnormalities, as taught by Vining et al. (column 1, lines 46-66).

11. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Linford et al. and Bartroli et al as applied to claims 3-8 above, and further in view of Vining et al. (U.S. Patent No. 5,920,319).

Regarding claims 10 and 12, as discussed above, Wang et al. in view of Linford et al. and Bartroli et al. meet the limitations of claim 7. However, they do not disclose that the 3D volume data set is compared to a library of geometrical patterns representative of predetermined abnormalities, nor that a structure is identified as abnormal if the structure is determined to match at least one of the geometrical patterns within a predetermined tolerance. They also do not disclose that further processing of the identified abnormal structure is performed to determine if the identified structure is abnormal. Vining et al. disclose a system and method for displaying a 3D rendering of a structure having a lumen and for automatically analyzing such structures for potential abnormalities (column 1, lines 15-19). They disclose that their method of identifying abnormal structures (lesions) involves forming populations of potential abnormalities based on vertices on the wireframe model associated with a library of geometrical patterns, such as abnormal wall thickness, abnormal shape, and abnormal curvature (column 10, lines 56- 67 through column 11, lines 1-10). Further, they disclose that populations with sizes below a minimum value are eliminated from being identified as abnormal (Figure 1, 46). Their method also involves further processing the identified abnormal structure to determine if the identified structure is not abnormal (column 11,

lines 22-35). At the time of the invention, it would have been obvious to include the above steps to the method. The motivation for doing so would have been to be able to provide a more efficient, less time-consuming, less expensive, and more accurate technique to identify abnormalities, as taught by Vining et al. (column 1, lines 46-66).

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine L. Fernandez whose telephone number is (571)272-1957. The examiner can normally be reached on 8:30-5, Monday-Friday.

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni M. Mantis-Mercader can be reached on (571)272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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